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EXECUTIVE SUMMARY

CANADA BRICK QUARRY SURFACE WATER SURVEY FOURTH ANNUAL REPORT, 1985

A. Golomb
Environmental and Inorganic Section
Chemical Research Department

Since December, 1981, fly ash from Lakeview TGS has been disposed of as landfill at Canada Brick Quarry, Mississauga, in accordance with a Provisional Certificate of Approval issued by the Ontario Ministry of the Environment which requires regular monitoring of local surface water and ground water. Mary Fix Creek, which traverses the Canada Brick Quarry ash disposal site, was sampled in July, 1985, under base flow conditions. To date no fly ash leachate has been discharged from the underdrain sump to the Creek. No change in major ion chemistry was observed along the flow path studied. There was dominance of alkali metal cations and strong acid anions throughout. Levels of suspended solids were low, and concentrations of total trace metals measured in unfiltered samples generally conformed to Provincial Water Quality Objectives for surface waters.

job	file	date	report no.
740631-162-892	837.71	November 29, 1985	85-326-K

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To: Mr. D. Erwin
Manager of Procurement - General Products
Supply Division

Attn: Mr. J.H.P. Buckingham
Senior Supervisor
Ash Management

CANADA BRICK QUARRY SURFACE WATER SURVEY FOURTH ANNUAL REPORT, 1985

A. Golomb

A sampling of Mary Fix Creek was carried out under base flow conditions in July, 1985. To date, no fly ash leachate has been discharged to the Creek. No change in major ion chemistry was observed along the flow path studied: there was dominance of alkali metal cations and strong acid anions throughout. Levels of suspended solids were low, and concentrations of total trace metals generally conformed to Provincial Water Quality Objectives for surface waters.

1. INTRODUCTION

In accordance with the MOE's Provisional Certificate No A220113, a monitoring program of surface water quality and water flow of the Mary Fix Creek has been under way at the Canada Brick Quarry Reclamation Project, Mississauga (Figure 1). The first three annual reports/1,2,3/ showed no significant change in surface water chemistry resulting from fly ash landfill operations, which commenced December 18, 1981. Calibration of the Mary Fix Creek flow rate (Figure 2) was completed in 1983: a 'portable' chain gauge was constructed and has since been used for all flow rate measurements at the CP railway overpass, where the Creek enters Canada Brick property.

job	file	date	report no.
740631-162-892	837.71	November 29, 1985	85-326-K

2. SURFACE WATER QUALITY MONITORING

As in previous years, no fly ash leachate was discharged into the Mary Fix Creek during 1985. Any leachate that collected in the fly ash leachate sump was pumped into a water spray truck and used for dust suppression at the site. On July 2, 1985, a sampling was carried out under base flow conditions (0.02 m^3/s).

Water samples were taken at each of four locations:

(i) CP Overpass (CPO)
(ii) South Property Fence (SPF)
(iii) Dundas Street Culvert (DSC)
and (iv) Paisley Street Bridge (PSB)[1]

To meet an MOE requirement for determination of total trace heavy metals in surface waters/4/, duplicate samples were taken. The following procedure (described in detail in Appendix A) was followed:

A pair of 1-L samples was taken at each location. One of each pair was filtered through a 0.45 µm Millipore filter prior to submission for chemical analysis, while the other was submitted unfiltered for determination of total trace heavy metals (except mercury)/4,5/.

Complete analytical data are given in Tables I to IV, together with all of the previous data to facilitate comparison. Major ion chemistry is summarized in Tables V to VIII. This data was used to construct Piper trilinear diagrams for each of the four sampling points.

2.1 Major Ion Chemistry

Mary Fix Creek water passing through Canada Brick Quarry (see Piper diagrams, Figures 3 to 6) during the July 2, 1985 sampling was found to remain consistently within the region of dominance of alkali metals and strong acid anions, ie, no change in major ion chemistry of the Creek water occurred within the Quarry. Between entering the survey area (at the CP overpass) and leaving (at the Paisley Street Bridge) there was an overall doubling of total dissolved solids, attributable to evaporation during the hot, dry weather.

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[1] Due to recent land development, the Creek was sampled about a city block downstream of the actual bridge in July, 1985.

2.2 Minor/Trace Metal Chemistry

Levels of suspended solids were low, and in general there was little difference between concentrations in the filtered and unfiltered aqueous samples. Most minor/trace components of water in the Mary Fix Creek remained at total concentrations below the Provincial Water Quality Objectives. Notable exceptions to this were:

> Copper (Objective 0.005 mg/L) present at the CP Overpass at 0.009 mg/L, passed the South Property Fence at 0.004 mg/L, remaining fairly steady thereafter.
>
> Silver (Objective 0.001 mg/L) was below detection limit at the CP Overpass and at the South Property Fence, rising to 0.002 mg/L at the Dundas Street Culvert before falling to below detection limit at the Paisley Street Bridge.
>
> Iron (Objective 0.3 mg/L) present at 0.18 mg/L at the CP Overpass, rose to 0.35 mg/L at the South Property Fence, fell to 0.095 mg/L at the Dundas Street Culvert and rose again to 0.4 mg/L at the Paisley Street Bridge.

Except for iron (a leachable component of earth materials present at the Quarry site/3/) none of these trace metals rose in concentration during passage through the Canada Brick Quarry property.

While there is no Provincial Water Quality Objective for nitrate in surface waters/4/ it is noteworthy that there was a substantial increase in nitrate concentrations, from about 0.1 mg/L at the CP Overpass to over 80 mg/L within Canada Brick property, leaving the monitored sector at ~70 mg/L at the Paisley Street Bridge. There is no obvious reason for this increase. The only other elevated levels for nitrate observed to date at the site have been noted in the Sump (eg, 46 mg/L in June, 1982). However, nitrate levels measured in local groundwaters have otherwise been very much lower/6/.

3.0 SUMMARY AND CONCLUSIONS

The Mary Fix Creek was sampled under base flow conditions in July, 1985. There were low levels of suspended solids present. At all four sampling points, the water was characterized by dominance of alkali metal cations and strong acid anions. Minor and trace metal components were below MOE Objectives for surface waters, except for Fe, Cu, and Ag, which at some survey locations were marginally excessive in the non-filtered samples. Except for iron, a leachable component of earth materials indigenous to the Quarry, none of these species rose between the CP Overpass and the South Property Fence. Available evidence indicates no contamination of the Mary Fix Creek by fly ash leachate from the disposal site.

No fly ash leachate has been discharged to the Creek to date. The monitoring programme continues.

Approved by:

for O.A. Kupcis
Manager
Chemical Research Dept

Submitted by:

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Engineer
Environmental and Inorganic Section

Reviewed by:

D.J.R. Dodd
Supervising Engineer
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AG:djb

REFERENCES

1. Ontario Hydro Research Division Report No 82-480-K.

2. Ontario Hydro Research Division Report No 83-523-K.

3. Ontario Hydro Research Division Report No 84-453-K.

4. "Water Management. Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment". Published November, 1978.

5. "Standard Methods for the Examination of Water and Wastewater", 15th Edition, Part 302, American Public Health Association, New York, N.Y., 1980.

6. Ontario Hydro Research Division Report No 84-452-K.

APPENDIX A

SURFACE WATER SAMPLE COLLECTION AND PREPARATION FOR ANALYSIS

Pairs of samples from each location were collected in specially acid-pretreated linear polyethylene (LPE) 1-L bottles, stored in a cooler (-4°C) and returned the same day to the laboratory. Details of sample handling and preservation, prior to submission for detailed chemical analysis, are described below.

(a) Filtered Samples

One sample of each pair was filtered in the laboratory through a 0.45 µm Millipore filter to remove suspended solids. The glass Millipore vacuum filtration apparatus was cleaned by soaking in 1:1 hydrochloric acid (HCl) followed by a deionized water rinse and a further soaking in 1:1 nitric acid (HNO_3). This was followed by several thorough rinsings with deionized water. Millipore filters were rinsed by passing 500 mL of deionized water through the filter and discarding the filtrate. A small volume (-20 mL) of the sample was passed through the filter and also discarded, then the bulk of the sample was filtered. The empty original sample container was rinsed several times with deionized water, given a final rinse using a small volume (-10 mL) of sample filtrate, and reused for storing the unacidified portion.

The portion of the filtrate for trace metal analysis was acidified with ultrapure HNO_3 to a background concentration of 0.1 M. The unacidified portion for alkalinity and anion analysis was stored at -4°C.

(b) Unfiltered Samples

To determine total concentrations of dissolved components (in particular, trace metals), samples were submitted for chemical analysis without filtration in accordance with MOE Objectives/3/. A portion of each was acidified with ultrapure HNO_3 to a background of 0.1 M, and an unacidified portion stored at -4°C pending alkalinity and anion analysis.

APPENDIX B

ANALYTICAL DATA,
MAJOR ION BALANCES
AND
PIPER DIAGRAMS*

*Notes: On computer printouts, sampling locations are indicated as follows:

CPO = CP Overpass
SPF = South Property Fence
DSC = Dundas Street Culvert
PSB = Paisley Street Bridge

EPM denotes 'equivalents per million'.

On Piper Diagrams

- ● denotes before ash placement commenced
- ● and • denote after ash placement commenced

TABLE I

DOMTAR SURFACE WATER

LOCATION : CPO

TEST	SAMPLING DATE									
	800507	811130	820314	820324	820813	820827	820924	830921	830922*	831017
AG	--	<.00020	--	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
AL	--	<.200	--	<.200	<.600	<.200	<.500	<.500	<.500	<.500
ALKCO3	2.00	--	<5.00	<5.00	24.0	<5.00	10.0	26.0	24.0	<5.00
ALKHCO3	201.	110.	36.0	86.0	240.	64.0	137.	163.	165.	64.0
ALKOH	<5.00	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	.00100	--	<.00100	.00100	<.00200	<.00200	<.00100	<.00100	.00100
B	--	<.500	--	<1.00	<.500	<.500	<1.00	.160	.190	.110
BA	--	<1.00	--	<2.00	<8.00	1.00	1.30	<2.00	<.500	<1.00
BE	--	--	--	--	<.00020	<.00020	<.00020	--	--	--
BR	--	.100	--	<.200	.600	<.200	1.40	.210	.590	<.0500
CA	81.0	57.0	15.0	34.0	116.	43.0	72.0	89.0	88.0	29.0
CD	--	.00090	--	.00030	<.00010	<.00010	<.00010	<.00010	<.00010	<.00010
CL	136.	40.0	26.0	60.0	177.	22.0	85.0	120.	130.	24.0
CO	--	--	--	--	--	--	<.0500	--	--	--
COND	94.0	47.0	19.0	39.0	124.	35.0	66.0	94.0	94.0	28.3
CR	--	<.100	--	<.0500	<.0500	.00300	<.0500	<.100	<.100	<.100
CR(VI)	--	.00900	--	.00800	.00400	--	--	<.0100	<.0100	<.0100
CU	--	.00300	--	.00500	.00400	.00800	.00300	.00400	.00500	.00300
FE	--	<.0500	--	.0500	<.0500	<.0500	<.0100	<.0500	.460	.130
HARD	303.	208.	49.0	120.	429.	142.	250.	313.	315.	96.0
HG	--	--	--	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
I	--	<.0100	--	<.0200	<.200	<.0500	<.0500	<.00500	<.00500	<.00500
K	6.00	4.90	3.90	4.30	4.00	3.40	4.90	.660	.670	4.90
MG	24.4	16.0	2.70	8.30	34.0	8.40	18.0	22.0	23.0	5.70
MN	--	<.0200	--	.200	.240	<.0200	<.0200	.0500	.0600	<.0500
MO	--	<.500	--	<.500	<.500	<.500	<.500	<.500	<.500	<.500
NA	60.8	20.0	16.0	27.0	97.0	12.0	34.0	71.0	71.0	16.0
NI	--	<.00500	--	<.00500	<.00500	<.00500	<.00500	<.00500	<.00500	<.00500
NO3	<.100	<.100	--	.100	<.200	17.0	4.50	<1.00	.440	.0200
PB	--	.00200	--	<.00200	<.00200	<.00200	<.00200	<.00200	<.00200	<.00200
PH	8.30	8.10	7.00	7.80	8.20	7.90	8.00	8.30	8.20	7.90
SE	--	.00100	--	<.00100	<.00200	<.00200	<.00200	<.00100	<.00100	<.00100
SIO2	--	5.00	--	3.30	4.80	3.60	7.40	7.47	7.10	3.60
SO4	81.0	70.0	14.0	26.0	140.	49.0	95.0	95.0	94.0	30.0
SR	--	.130	--	.140	.800	.130	.280	.500	.500	.120
TDS105	--	370.	--	260.	756.	208.	380.	628.	614.	190.
TI	--	<.500	--	<1.00	<2.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	15.0	22.0	12.0	17.0	6.00	4.00	8.00
TSS105	--	22.0	--	--	--	--	31.0	7.00	7.00	--
U	--	<.0100	--	<.0100	<.0600	<.0200	<.00100	<.0100	<.0100	<.0500
V	--	<.00500	--	<.0100	<.0200	<.00300	<.500	<.00500	<.00500	<.00500
ZN	--	<.0200	--	<.0200	<.0200	<.0200	< 0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE I (cont'd)

(CONT'D) DOMTAR SURFACE WATER

LOCATION : CPD

TEST	SAMPLING DATE 831018*	840217	840218*	840930	841001*	850702	850703*
AG	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
AL	6.00	<.500	6.80	<.500	1.60	<1.00	<1.00
ALKCO3	<5.00	<5.00	<5.00	7.00	<5.00	<5.00	<5.00
ALKHCO3	68.0	37.0	45.0	95.0	103.	218.	219.
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<.00100	<.00100	.00100	<.00100	<.00100	<.00100	<.00100
B	.110	.0800	.0500	<.0500	<.0500	.150	.180
BA	<1.00	<1.00	<1.00	<2.00	<2.00	<5.00	<5.00
BE	--	--	--	--	--	--	--
BR	<.0500	<.100	<.100	<.200	.200	.900	<.500
CA	31.0	21.4	26.9	34.7	46.1	130.	129.
CD	.00020	<.00010	<.00010	<.00010	<.00010	<.00030	<.00030
CL	24.0	61.5	66.1	99.0	98.0	639.	572.
CO	--	--	--	--	--	--	--
COND	28.6	34.0	34.0	62.0	61.0	241.	240.
CR	<.100	<.0500	<.0500	<.100	<.100	<.100	<.100
CR(VI)	<.0100	<.0100	<.0100	<.0100	<.0100	<.00500	<.00500
CU	.0100	.00900	.0120	.00200	.00800	.00700	.00900
FE	5.60	.100	9.60	<.100	.880	<.0500	.180
HARD	119.	71.0	116.	137.	166.	494.	491.
HG	<.00020	<.00020	<.00020	<.00020	.00060	<.00020	<.00020
I	<.00500	<.0500	<.0500	.0600	<.0600	<.100	<.100
K	6.30	3.10	7.30	4.87	5.49	6.75	6.48
MG	7.80	4.30	7.70	12.2	12.5	40.7	41.2
MN	.260	.0800	.340	<.0500	<.0500	.0980	.0980
MO	<.500	<.500	<.500	<.500	<.500	<.500	.500
NA	16.0	35.0	33.0	34.6	47.8	310.	313.
NI	.00600	<.00500	.0100	<.00500	<.00500	<.0100	<.0100
NO3	1.43	4.09	4.20	.130	.0900	.111	<.00900
PB	.0160	<.00200	.00800	<.00200	<.00200	<.00500	<.00500
PH	7.70	7.40	7.50	7.90	7.60	8.30	8.30
SE	<.00100	<.00100	<.00100	<.00100	<.00100	<.00100	<.00100
SIO2	3.70	2.94	12.0	2.70	8.50	1.41	2.06
SO4	29.0	17.3	18.3	44.0	43.0	151.	140.
SR	.150	.100	.130	.340	.340	1.22	1.22
TDS105	190.	222.	230.	392.	378.	1460.	1350.
TI	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	10.0	12.4	12.3	25.0	25.0	30.0	27.5
TSS105	15.0	--	387.	--	--	--	3.10
U	<.0500	<.0100	<.0100	<.0500	<.0500	<.100	<.100
V	<.00500	<.00500	.0300	<.0100	<.0100	<.100	<.0500
ZN	.0400	<.0200	.0300	<.0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE II

DOMTAR SURFACE WATER

LOCATION : SPF

TEST	SAMPLING DATE 800507	811130	820314	820324	820813	820827	820924	830921	830922*	831017
AG	--	.00020	--	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
AL	--	<.200	--	<.200	<3.00	<.200	<.500	<.500	<.500	<.500
ALKCO3	5.60	--	<5.00	<5.00	14.0	<5.00	13.0	14.0	25.0	<5.00
ALKHCO3	190.	110.	48.0	83.0	99.0	63.0	120.	117.	107.	67.0
ALKOH	<5.00	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	.00100	--	<.00100	<.00100	<.00200	<.00200	.00100	.00100	.00500
B	--	<.500	--	<1.00	2.50	<.500	<1.00	2.10	2.11	.200
BA	--	<1.00	--	<2.00	<40.0	1.00	1.40	<2.00	<2.00	<1.00
BE	--	--	--	--	<.00020	<.00020	<.00020	--	--	--
BR	--	.100	--	<.200	16.0	.300	1.50	12.0	12.0	.150
CA	79.0	57.0	17.0	33.0	259.	45.0	72.0	207.	208.	23.0
CD	--	.00020	--	<.00100	<.00010	<.00010	<.00010	<.00010	<.00010	.00010
CL	122.	42.0	34.0	55.0	1700.	41.0	215.	1200.	1130.	35.0
CO	--	--	--	--	--	--	<.0500	--	--	--
COND	90.0	50.0	23.3	36.5	600.	43.0	107.	445.	445.	34.0
CR	--	<.100	--	<.0500	<.0500	.00400	<.0500	<.100	<.100	<.100
CR(VI)	--	.00500	--	<.00500	.00400	--	--	<.0100	<.0100	<.0100
CU	--	.00300	--	.00500	.00700	.00700	.00300	.00300	.00400	.00300
FE	--	.0500	--	.0500	<.0500	<.0500	<.100	<.0500	.410	.130
HARD	291.	215.	56.0	116.	869.	148.	250.	707.	712.	97.0
HG	--	--	--	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
I	--	<.0100	--	<.0200	<1.00	<.0500	<.0500	<.0200	<.0200	<.00500
K	5.00	5.40	4.00	4.60	42.0	4.10	9.80	35.0	35.0	6.20
MG	22.8	16.0	3.30	8.10	54.0	8.60	18.0	46.0	47.0	6.10
MN	--	<.0200	--	.200	.0400	<.0200	<.0200	.0500	.0600	<.0500
MO	--	.500	--	<.500	<.500	<.500	<.500	<.500	<.500	<.500
NA	61.0	26.0	19.0	28.0	900.	2.90	105.	630.	640.	27.0
NI	--	<.00500	--	<.00500	.0120	<.00500	<.00500	<.00500	<.00500	<.00500
NO3	<.100	<.100	--	.100	15.0	21.0	8.00	13.0	10.1	1.36
PB	--	<.00200	--	.0200	<.00200	<.00200	<.00200	<.00200	<.00200	.00200
PH	8.50	8.20	7.40	7.90	8.20	7.90	8.10	8.20	8.10	7.50
SE	--	<.00100	--	<.00100	<.00200	<.00200	<.00200	.00300	.00300	<.00100
SIO2	--	6.50	--	3.80	2.60	4.00	6.80	4.67	3.98	3.66
SO4	78.0	72.0	14.0	23.0	450.	63.0	145.	330.	330.	38.0
SR	--	.130	--	.140	4.80	.200	.640	2.85	2.85	.190
TDS105	--	370.	--	252.	3770.	260.	620.	2810.	2680.	220.
TI	--	<.500	--	<1.00	<10.0	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	15.0	9.00	10.0	17.0	12.0	14.0	13.0
TSS105	--	41.0	--	--	--	--	85.0	15.0	15.0	--
U	--	<.0100	--	<.0100	<.300	<.0200	<.00100	<.0500	<.0500	<.0500
V	--	<.00500	--	<.0100	<.100	<.00300	<.500	<.0200	<.0200	<.00500
ZN	--	<.0200	--	<.0200	<.0200	<.0200	<.0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE II (cont'd)

(CONT'D) DOMTAR SURFACE WATER

LOCATION : SPF

TEST	SAMPLING DATE 831018*	840217	840218*	840930	841001*	850702	850703*
AG	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
AL	23.0	<.500	9.00	<.500	1.90	<1.00	<1.00
ALKCO3	<5.00	<5.00	<5.00	9.00	<5.00	<5.00	<5.00
ALKHCO3	94.0	39.0	50.0	94.0	103.	137.	138.
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<.00100	<.00100	.00200	<.00100	<.00100	<.00100	<.00100
B	.200	.0700	.0700	.150	.200	3.04	3.05
BA	<1.00	<1.00	<1.00	<2.00	3.00	<5.00	<5.00
BE	--	--	--	--	--	--	--
BR	.250	<.100	.200	.500	.500	12.0	12.0
CA	40.0	22.0	35.0	35.7	49.9	261.	264.
CD	.00030	<.00010	<.00010	<.00010	<.00010	<.00030	<.00030
CL	35.0	65.4	66.6	125.	118.	1420.	1310.
CO	--	--	--	--	--	--	--
COND	34.1	36.0	37.0	70.0	70.0	505.	505.
CR	<.100	<.0500	<.0500	<.100	<.100	<.100	<.100
CR(VI)	<.0100	<.0100	<.0100	<.0100	<.0100	<.00500	<.00500
CU	.0300	.00300	.0170	.00800	.00700	.00600	.00400
FE	38.0	.0900	16.0	<.100	1.48	<.0500	.351
HARD	250.	73.0	159.	120.	164.	881.	900.
HG	<.00020	<.00020	<.00020	.00060	.00070	.00030	.00020
I	<.00500	<.0500	<.0500	<.0600	<.0600	<.100	<.200
K	9.20	3.40	8.30	3.98	5.45	40.4	42.5
MG	20.0	4.50	10.5	7.50	9.60	55.9	58.6
MN	.750	.0800	.460	<.0500	<.0500	.0500	.0500
MO	<.500	<.500	<.500	<.500	<.500	1.27	1.27
NA	27.0	43.0	36.0	49.4	70.8	720.	725.
NI	.0240	<.00500	.0100	<.00500	<.00500	<.0100	<.0100
NO3	2.21	3.94	4.91	.180	.130	82.0	83.7
PB	.0210	<.00200	.0100	<.00200	<.00200	<.00500	<.00500
PH	7.80	7.30	7.60	7.90	7.70	8.20	8.20
SE	<.00100	<.00100	<.00100	<.00100	<.00100	.00400	.00200
SIO2	3.64	3.11	103.	2.70	9.80	3.45	10.2
SO4	36.0	18.5	19.6	50.0	45.6	768.	718.
SR	.280	.120	.160	.490	.520	5.95	5.95
TDS105	240.	230.	244.	423.	430.	3440.	3250.
TI	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	12.0	11.8	13.5	19.0	21.0	25.0	26.5
TSS105	31.0	--	590.	--	--	--	35.2
U	<.0500	<.0100	<.0100	<.0500	<.0500	<.100	<.100
V	.0170	<.00500	.0800	<.0100	<.0100	<.100	<.0500
ZN	.120	<.0200	.0400	<.0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE III

DOMTAR SURFACE WATER

LOCATION : DSC

TEST	800507	811130	820314	820324	SAMPLING DATE 820813	820827	820924	830921	830922*	831017
AG	--	--	--	--	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
AL	--	--	--	--	<3.00	<.200	<.500	<.500	<.500	<.500
ALKCO3	--	--	<5.00	--	17.0	<5.00	13.0	15.0	27.0	<5.00
ALKHCO3	--	--	36.0	--	92.0	66.0	121.	121.	110.	75.0
ALKOH	--	--	<5.00	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	--	--	--	<.00100	<.00200	<.00200	.00100	.00100	.00401
B	--	--	--	--	2.50	<.500	<1.00	2.05	2.06	.180
BA	--	--	--	--	<40.0	1.00	1.30	<2.00	<2.00	<1.00
BE	--	--	--	--	<.00020	<.00020	<.00020	--	--	--
BR	--	--	--	--	14.0	.300	.200	12.0	10.0	.150
CA	--	--	15.0	--	262.	44.0	70.0	214.	208.	33.0
CD	--	--	--	--	<.00010	<.00010	<.00010	<.00010	<.00010	.00010
CL	--	--	26.0	--	1570.	38.0	165.	1200.	1030.	40.0
CO	--	--	--	--	--	--	<.0500	--	--	--
COND	--	--	20.0	--	560.	42.0	105.	450.	450.	37.6
CR	--	--	--	--	<.0500	.00600	<.0500	<.100	<.100	<.100
CR(VI)	--	--	--	--	.00500	--	--	<.0100	<.0100	<.0100
CU	--	--	--	--	.00700	.00700	.00500	.00400	.00400	.00300
FE	--	--	--	--	<.0500	<.0500	<.100	<.0500	.360	.110
HARD	--	--	49.0	--	881.	146.	250.	742.	717.	111.
HG	--	--	--	--	<.00020	.00020	<.00020	<.00020	<.00020	<.00020
I	--	--	--	--	<1.00	<.0500	<.0500	<.0200	<.0200	<.00500
K	--	--	3.90	--	38.0	4.20	9.50	35.0	35.0	5.90
MG	--	--	2.70	--	55.0	8.80	18.0	48.0	48.0	7.20
MN	--	--	--	--	<.0200	<.0200	<.0200	<.0500	.0400	<.0500
MO	--	--	--	--	<.500	<.500	<.500	<.500	<.500	<.500
NA	--	--	14.0	--	835.	2.70	98.0	648.	640.	28.0
NI	--	--	--	--	.0120	<.00500	.00500	<.00500	<.00500	<.00500
NO3	--	--	--	--	13.0	21.0	8.00	11.0	9.73	1.20
PB	--	--	--	--	<.00200	<.00200	<.00200	<.00200	<.00200	.00200
PH	--	--	7.20	--	8.10	7.90	8.20	8.20	8.26	8.10
SE	--	--	--	--	.0220	<.00200	<.00200	.00300	.00300	<.00100
SIO2	--	--	--	--	2.30	2.40	6.40	4.88	4.36	4.24
SO4	--	--	14.0	--	450.	61.0	110.	330.	320.	40.0
SR	--	--	--	--	5.50	.200	.590	2.85	2.85	.220
TDS105	--	--	--	--	3410.	262.	590.	2800.	2860.	240.
TI	--	--	--	--	<10.0	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	--	10.0	9.00	16.0	7.00	7.00	12.0
TSS105	--	--	--	--	--	--	53.0	11.0	11.0	--
U	--	--	--	--	<.300	<.0200	<.00100	<.0500	<.0500	<.0500
V	--	--	--	--	<.100	.00300	<.500	<.0200	<.0200	<.00500
ZN	--	--	--	--	<.0200	<.0200	<.0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE III (cont'd)

(CONT'D) DOMTAR SURFACE WATER

LOCATION : DSC

TEST	SAMPLING DATE 831018*	840217	840218*	840930	841001*	850702	850703*
AG	<.00020	<.00020	<.00020	<.00020	<.00020	.00130	.00200
AL	13.0	.500	10.0	<.500	2.80	<1.00	<1.00
ALKCO3	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
ALKHCO3	91.0	40.0	52.0	104.	108.	137.	138.
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<.00100	<.00100	.00200	<.00100	<.00100	<.00100	<.00100
B	.190	.0600	.0600	.160	.230	3.19	3.19
BA	<1.00	<1.00	<1.00	<2.00	<2.00	<7.00	<5.00
BE	--	--	--	--	--	--	--
BR	.190	<.100	<.100	.700	.300	13.0	12.0
CA	38.0	22.1	35.0	51.1	41.5	267.	263.
CD	.00020	<.00010	<.00010	<.00010	<.00010	<.00030	<.00030
CL	39.0	64.9	68.1	140.	133.	1340.	1470.
CO	--	--	--	--	--	--	--
COND	37.8	36.0	38.0	74.0	74.0	500.	500.
CR	<.100	<.0500	<.0500	<.100	<.100	<.100	<.100
CR(VI)	<.0100	<.0100	<.0100	<.0100	<.0100	<.00500	<.00500
CU	.0140	.00300	.0190	.00400	.00800	.0100	.00400
FE	20.0	.0600	17.5	<.100	1.57	<.0500	.0950
HARD	184.	74.0	164.	180.	159.	892.	891.
HG	<.00020	<.00020	<.00020	.00100	.00070	.00020	.00020
I	<.00500	<.0500	<.0500	<.0600	.350	<.200	<.100
K	8.10	3.40	9.70	6.96	8.18	43.2	39.8
MG	13.0	4.60	11.1	12.9	13.7	54.9	57.0
MN	.420	.0700	.490	<.0500	<.0500	<.0500	<.0500
MO	<.500	<.500	<.500	<.500	<.500	1.45	1.45
NA	28.0	39.0	37.0	78.9	61.9	712.	719.
NI	.0120	<.00500	.0100	<.00500	<.00500	<.0100	<.0100
NO3	2.13	3.87	4.88	.180	.130	86.4	85.1
PB	.0160	<.00200	.0110	<.00200	<.00200	<.00500	<.00500
PH	7.80	7.40	7.60	7.80	7.70	8.30	8.30
SE	<.00100	<.00100	<.00100	<.00100	<.00100	.00300	.00300
SIO2	4.00	2.94	103.	2.70	11.5	3.41	3.56
SO4	41.0	20.1	19.5	54.0	53.4	788.	880.
SR	.280	.120	.170	.500	.970	6.01	6.01
TDS105	250.	228.	246.	466.	462.	3310.	3270.
TI	<1.00	<1.00	<1.00	<1.00	1.30	<1.00	<1.00
TOC	13.0	12.2	12.7	24.0	26.0	23.5	22.0
TSS105	24.0	--	630.	--	--	--	24.1
U	<.0500	<.0100	<.0100	<.0500	<.0500	<.100	<.100
V	.0180	<.00500	.0700	<.0100	<.0100	<.100	<.0500
ZN	.0700	<.0200	.0500	<.0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE IV

DOMTAR SURFACE WATER

LOCATION : PSB

SAMPLING DATE

TEST	800507	811130	820314	820324	820813	820827	820924	830921	830922*	831017
AG	--	<.00020	--	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
AL	--	<.200	--	<.200	<.600	<.200	<.500	<.500	<.500	<.500
ALKCO3	--	--	--	<5.00	19.0	<5.00	9.00	22.0	27.0	<5.00
ALKHCO3	--	110.	--	86.0	160.	65.0	133.	127.	122.	72.0
ALKOH	--	--	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	.00100	--	<.00100	<.00100	<.00200	<.00200	.00100	.00100	.00300
B	--	<.500	--	<1.00	<.500	<.500	<1.00	1.66	1.71	.200
BA	--	<1.00	--	<2.00	<8.00	1.00	1.40	<2.00	<2.00	<1.00
BE	--	--	--	--	<.00020	<.00020	<.00020	--	--	--
BR	--	.100	--	<.200	1.60	.300	.600	11.0	10.0	.210
CA	--	58.0	--	34.0	97.0	43.0	70.0	220.	223.	30.0
CD	--	.00100	--	<.00010	<.00010	<.00010	<.00010	<.00010	<.00010	<.00010
CL	--	46.0	--	50.0	242.	38.0	165.	1100.	1060.	36.0
CO	--	--	--	--	--	--	<.0500	--	--	--
COND	--	48.0	--	39.0	141.	41.0	79.0	420.	420.	35.0
CR	--	<.100	--	<.0500	<.0500	.00400	<.0500	<.100	<.100	<.100
CR(VI)	--	.00500	--	.00700	.00400	--	--	<.0100	<.0100	<.0100
CU	--	.00300	--	.00500	.0130	.0120	.00700	.00500	.00400	.00303
FE	--	<.0500	--	.0500	<.0500	<.0500	<.100	<.0500	.230	.380
HARD	--	211.	--	120.	333.	143.	250.	759.	770.	93.0
HG	--	--	--	<.00020	<.00020	.00020	<.00020	<.00020	<.00020	<.00020
I	--	<.0100	--	<.0200	<.200	<.0500	<.0500	<.0200	<.0200	<.00500
K	--	5.80	--	4.70	11.0	4.20	6.20	29.0	29.0	5.90
MG	--	16.0	--	8.10	22.0	8.70	18.0	51.0	52.0	6.70
MN	--	<.0200	--	<.100	<.0200	<.0200	<.0200	<.0500	<.0500	<.0500
MO	--	<.500	--	<.500	<.500	<.500	<.500	<.500	<.500	<.500
NA	--	26.0	--	30.0	173.	2.70	55.0	570.	570.	27.0
NI	--	<.00500	--	<.00500	<.00500	<.00500	.0100	<.00500	<.00500	<.00500
NO3	--	.500	--	.100	3.00	20.0	8.00	7.90	7.68	1.78
PB	--	.00900	--	<.00200	<.00200	<.00200	<.00200	<.00200	<.00200	.00200
PH	--	8.10	--	7.90	8.30	7.90	8.00	8.30	8.20	8.00
SE	--	<.00100	--	<.00100	.00400	<.00200	<.00200	.00200	.00200	<.00100
SIO2	--	15.0	--	2.60	3.70	4.10	6.20	5.62	5.09	3.66
SO4	--	74.0	--	24.0	175.	59.0	140.	310.	290.	38.0
SR	--	.130	--	.140	1.12	.200	.400	2.50	2.50	.220
TDS105	--	370.	--	236.	848.	242.	490.	2700.	2730.	220.
TI	--	<.500	--	<1.00	<2.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	14.0	17.0	10.0	16.0	5.00	2.00	13.0
TSS105	--	48.0	--	--	--	--	34.0	7.00	7.00	--
U	--	<.0100	--	<.0100	<.0600	<.0200	<.00100	<.0500	<.0500	<.0500
V	--	<.00500	--	<.0100	<.0200	<.00300	<.500	<.0200	<.0200	<.00500
ZN	--	<.0200	--	<.0200	<.0200	<.0200	<.0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE IV (cont'd)

(CONT'D) DOMTAR SURFACE WATER

LOCATION : PSB

TEST	SAMPLING DATE 831018 *	840217	840218 *	840930	841001 *	850702	850703 *
AG	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020	<.00020
AL	13.0	<.500	12.0	<.500	1.80	<1.00	<1.00
ALKCO3	<5.00	<5.00	<5.00	12.0	<5.00	<5.00	<5.00
ALKHCO3	87.0	40.0	55.0	129.	140.	160.	161.
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<.00100	<.00100	.00300	<.00100	<.00100	<.00100	<.00100
B	.150	.0700	.0600	.330	.350	2.45	2.44
BA	<1.00	<1.00	<1.00	<2.00	<2.00	<6.00	<5.00
BE	--	--	--	--	--	--	--
BR	<.0500	<.100	<.100	.900	.600	10.0	9.00
CA	38.0	22.6	41.0	63.5	66.5	239.	236.
CD	.00020	<.00010	<.00010	<.00010	<.00010	<.00030	<.00030
CL	35.0	65.4	66.7	140.	138.	1070.	1080.
CO	--	--	--	--	--	--	--
COND	35.2	36.0	38.0	86.0	86.0	440.	440.
CR	<.100	<.0500	<.0500	<.100	<.100	<.100	<.100
CR(VI)	<.0100	<.0100	<.0100	<.0100	<.0100	<.00500	<.00500
CU	.0140	.00300	.0230	.00400	.00600	.0100	.00600
FE	28.0	.0600	21.6	<.100	1.08	<.0500	.395
HARD	184.	75.0	194.	223.	235.	805.	804.
HG	<.00020	<.00020	<.00020	.00080	.00060	.00030	<.00020
I	<.00500	<.0500	<.0500	<.0600	<.0600	<.200	<.100
K	7.90	3.50	8.70	9.21	10.3	34.1	31.8
MG	13.0	4.60	13.0	15.8	16.7	50.9	52.3
MN	.400	.0800	.650	<.00500	<.0500	<.0500	<.0500
MO	<.500	<.500	<.500	<.500	<.500	1.00	1.00
NA	28.0	40.0	38.0	87.4	86.6	605.	615.
NI	.0120	<.00500	.0100	<.00500	<.00500	<.0100	<.0100
NO3	2.00	3.94	5.01	.188	.130	68.7	70.0
PB	.0170	<.00200	.0230	<.00200	<.00200	<.00500	<.00500
PH	7.80	7.50	7.60	8.00	7.80	8.30	8.20
SE	<.00100	<.00100	<.00100	<.00100	<.00100	.00200	.00200
SIO2	3.66	3.39	126.	5.30	8.30	1.55	3.86
SO4	37.0	18.6	19.5	74.0	81.0	599.	608.
SR	.270	.120	.200	1.07	1.00	5.00	5.00
TDS105	230.	228.	250.	520.	516.	2830.	2790.
TI	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	12.0	11.5	10.6	25.0	27.0	21.0	26.0
TSS105	75.0	--	920.	--	--	--	1.60
U	<.0500	<.0100	<.0100	<.0500	<.0500	<.100	<.100
V	.0110	<.00500	.0800	<.0100	<.0100	<.100	<.0500
ZN	.0700	<.0200	.100	<.0200	<.0200	<.0200	<.0200

* Non-filtered sample.

TABLE V

MAJOR ION CHEMISTRY

DOMTARSURF
.TYPE - WATER
LOCATION CPO

DOMTAR QUARRY PIPER DIAGRAM

	CATIONS												CATION TOTAL	ANION TOTAL
	CA			MG			NA			K				
DATE	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	EPM	EPM
MAY 07 1980	81	4.04	46	24	2.01	23	68	2.61	30	6	.15	2	8.81	9.58
NOV 30 1981	57	2.84	55	16	1.32	26	20	.87	17	5	.13	2	5.15	4.78
MAR 14 1982	15	.75	42	3	.22	13	16	.70	39	4	.10	6	1.77	1.74
MAR 24 1982	34	1.70	46	8	.68	19	27	1.17	32	4	.11	3	3.66	3.95
AUG 13 1982	116	5.79	45	34	2.80	22	97	4.22	33	4	.10	1	12.90	13.18
AUG 27 1982	43	2.14	62	8	.69	20	12	.52	15	3	.09	3	3.44	2.92*
SEPT 24 1982	72	3.59	54	18	1.48	22	34	1.48	22	5	.13	2	6.68	7.31
SEPT 21 1983	89	4.44	47	22	1.81	19	71	3.09	33	1	.02	0	9.35	9.14
SEPT 22 1983	88	4.39	47	23	1.89	20	71	3.09	33	1	.02	0	9.39	9.48
OCT 17 1983	29	1.45	53	6	.47	17	16	.70	25	5	.13	5	2.74	2.58
OCT 18 1983	31	1.55	51	8	.64	21	16	.70	23	6	.16	5	3.04	2.64*
FEB 17 1984	21	1.07	35	4	.35	12	35	1.52	50	3	.08	3	3.02	2.83
FEB 18 1984	27	1.34	37	8	.63	18	33	1.43	40	7	.19	5	3.60	3.14*
SEPT 30 1984	35	1.73	40	12	1.00	23	35	1.50	34	5	.12	3	4.36	5.74*
OCT 01 1984	46	2.30	41	13	1.03	19	48	2.08	37	5	.14	3	5.55	5.71
JULY 02 1985	130	6.48	28	41	3.35	14	310	13:48	57	7	.17	1	23.48	25.50
JULY 03 1985	129	6.43	27	41	3.39	14	313	13.61	58	6	.17	1	23.60	23.41

* INDICATES ANION AND CATION TOTALS DON'T LIE WITHIN 10% OF EACH OTHER.

+ INDICATES A MAJOR PARAMETER IS MISSING.

TABLE V (cont'd)

MAJOR ION CHEMISTRY

DOMTARSURF
TYPE - WATER
LOCATION CPO

DOMTAR QUARRY PIPER DIAGRAM

DATE	ANIONS CL MG/L	CL EPM	CL %EPM	SO4 MG/L	SO4 EPM	SO4 %EPM	HCO3 MG/L	HCO3 EPM	HCO3 %EPM	CO3 MG/L	CO3 EPM	CO3 %EPM	ANION TOTAL EPM	CATION TOTAL EPM
MAY 07 1980	136	3.83	40	81	1.69	18	245	4.02	42	1	.04	0	9.58	8.81
NOV 30 1981	40	1.13	24	70	1.46	30	134	2.20	46	0	.00	0	4.78	5.15
MAR 14 1982	26	.73	42	14	.29	17	44	.72	41	<5.00	.00	0	1.74	1.77
MAR 24 1982	60	1.69	43	26	.54	14	105	1.72	44	<5.00	.00	0	3.95	3.66
AUG 13 1982	177	4.99	38	140	2.91	22	293	4.80	36	14	.48	4	13.18	12.90
AUG 27 1982	22	.62	21	49	1.02	35	78	1.28	44	<5.00	.00	0	2.92	3.44*
SEPT 24 1982	85	2.39	33	95	1.98	27	167	2.74	37	6	.20	3	7.31	6.68
SEPT 21 1983	120	3.38	37	95	1.98	22	199	3.26	36	16	.52	6	9.14	9.35
SEPT 22 1983	130	3.66	39	94	1.96	21	201	3.30	35	14	.48	5	9.40	9.39
OCT 17 1983	24	.68	26	30	.62	24	78	1.28	50	<5.00	.00	0	2.58	2.74
OCT 18 1983	24	.68	26	29	.60	23	83	1.36	52	<5.00	.00	0	2.64	3.04*
FEB 17 1984	62	1.73	61	17	.36	13	45	.74	26	<5.00	.00	0	2.83	3.02
FEB 18 1984	66	1.86	59	18	.38	12	55	.90	29	<5.00	.00	0	3.14	3.60*
SEPT 30 1984	99	2.79	49	44	.92	16	116	1.90	33	4	.14	2	5.74	4.36*
OCT 01 1984	98	2.76	48	43	.89	16	126	2.06	36	<5.00	.00	0	5.71	5.55
JULY 02 1985	639	18.00	71	151	3.14	12	266	4.36	17	<5.00	.00	0	25.50	23.48
JULY 03 1985	572	16.11	69	140	2.91	12	267	4.38	19	<5.00	.00	0	23.41	23.60

* INDICATES ANION AND CATION TOTALS DON'T LIE WITHIN 10% OF EACH OTHER.

+ INDICATES A MAJOR PARAMETER IS MISSING.

TABLE VI

MAJOR ION CHEMISTRY

DOMTARSURF
TYPE - WATER
LOCATION SPF

DOMTAR QUARRY PIPER DIAGRAM

	CATIONS												CATION TOTAL	ANION TOTAL
	CA			MG			NA			K				
DATE	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	EPM	EPM
MAY 07 1980	79	3.94	46	23	1.88	22	61	2.65	31	5	.13	1	8.60	8.97
NOV 30 1981	57	2.84	52	16	1.32	24	26	1.13	21	5	.14	3	5.43	4.08*
MAR 14 1982	17	.85	41	3	.27	13	19	.83	40	4	.10	5	2.05	2.05
MAR 24 1982	33	1.65	45	8	.67	18	28	1.22	33	5	.12	3	3.65	3.69
AUG 13 1982	259	12.92	22	54	4.44	8	900	39.13	68	42	1.07	2	57.57	59.51
AUG 27 1982	45	2.24	71	9	.71	22	3	.13	4	4	.10	3	3.18	3.73*
SEPT 24 1982	72	3.59	36	18	1.48	15	105	4.57	46	10	.25	3	9.89	11.73*
SEPT 21 1983	207	10.32	24	46	3.79	9	630	27.39	65	35	.90	2	42.40	43.29
SEPT 22 1983	208	10.37	24	47	3.87	9	640	27.83	65	35	.90	2	42.96	41.34
OCT 17 1983	29	1.45	44	6	.50	15	27	1.17	36	6	.16	5	3.28	3.12
OCT 18 1983	40	2.00	40	20	1.65	33	27	1.17	23	9	.24	5	5.05	3.61*
FEB 17 1984	22	1.10	32	5	.37	11	43	1.87	55	3	.09	3	3.42	3.01*
FEB 18 1984	35	1.75	40	11	.86	20	36	1.57	36	8	.21	5	4.39	3.28*
SEPT 30 1984	36	1.78	38	8	.62	13	49	2.15	46	4	.10	2	4.65	6.62*
OCT 01 1984	50	2.49	38	10	.79	12	71	3.08	47	5	.14	2	6.50	6.33
JULY 02 1985	261	13.02	26	56	4.60	9	720	31.30	63	40	1.03	2	49.96	58.72*
JULY 03 1985	264	13.17	26	59	4.82	10	725	31.52	62	43	1.09	2	50.60	54.60

* INDICATES ANION AND CATION TOTALS DON'T LIE WITHIN 10% OF EACH OTHER.

+ INDICATES A MAJOR PARAMETER IS MISSING.

TABLE VI (cont'd)

MAJOR ION CHEMISTRY

DOMTARSURF
TYPE - WATER
LOCATION SPF

DOMTAR QUARRY PIPER DIAGRAM

DATE	ANIONS CL MG/L	CL EPM	CL %EPM	SO4 MG/L	SO4 EPM	SO4 %EPM	HCO3 MG/L	HCO3 EPM	HCO3 %EPM	CO3 MG/L	CO3 EPM	CO3 %EPM	ANION TOTAL EPM	CATION TOTAL EPM
MAY 07 1980	122	3.44	38	78	1.62	18	252	3.80	42	3	.11	1	8.97	8.60
NOV 30 1981	42	1.18	24	72	1.50	31	134	2.20	45	0	.00	0	4.88	5.43*
MAR 14 1982	34	.96	47	14	.29	14	49	.80	39	<5.00	.00	0	2.05	2.05
MAR 24 1982	55	1.55	42	23	.48	13	181	1.66	45	<5.00	.00	0	3.69	3.65
AUG 13 1982	1700	47.89	80	450	9.37	16	121	1.98	3	8	.28	0	59.51	57.57
AUG 27 1982	41	1.15	31	63	1.31	35	77	1.26	34	<5.00	.00	0	3.73	3.18*
SEPT 24 1982	215	6.06	52	145	3.02	26	146	2.40	20	8	.26	2	11.73	9.89*
SEPT 21 1983	1200	33.80	78	330	6.87	16	143	2.34	5	8	.28	1	43.29	42.40
SEPT 22 1983	1130	31.83	77	330	6.87	17	131	2.14	5	15	.50	1	41.34	42.96
OCT 17 1983	35	.99	32	38	.79	25	82	1.34	43	<5.00	.00	0	3.12	3.28
OCT 18 1983	35	.99	27	36	.75	21	115	1.88	52	<5.00	.00	0	3.61	5.05*
FEB 17 1984	65	1.84	61	19	.39	13	48	.78	26	<5.00	.00	0	3.01	3.42*
FEB 18 1984	67	1.88	57	20	.41	12	61	1.00	30	<5.00	.00	0	3.28	4.39*
SEPT 30 1984	125	3.52	53	50	1.04	16	115	1.88	28	5	.18	3	6.62	4.65*
OCT 01 1984	118	3.32	52	46	.95	15	126	2.06	33	<5.00	.00	0	6.33	6.50
JULY 02 1985.	1420	40.00	68	768	15.98	27	167	2.74	5	<5.00	.00	0	58.72	49.96*
JULY 03 1985	1310	36.90	68	718	14.94	27	168	2.76	5	<5.00	.00	0	54.60	50.60

* INDICATES ANION AND CATION TOTALS DON'T LIE WITHIN 10% OF EACH OTHER.

+ INDICATES A MAJOR PARAMETER IS MISSING.

TABLE VII

MAJOR ION CHEMISTRY

DOMTARSURF
TYPE - WATER
LOCATION DSC

DOMTAR QUARRY PIPER DIAGRAM

	CATIONS												CATION TOTAL	ANION TOTAL
	CA			MG			NA			K				
DATE	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	EPM	EPM
MAR 14 1982	15	.75	45	3	.22	13	14	.61	36	4	.10	6	1.68	1.74
AUG 13 1982	262	13.07	24	55	4.53	8	835	36.30	66	38	.97	2	54.87	55.91
AUG 27 1982	44	2.19	78	9	.72	23	3	.12	4	4	.11	3	3.14	3.66*
SEPT 24 1982	70	3.49	37	18	1.48	16	98	4.26	45	10	.24	3	9.48	9.62
SEPT 21 1983	214	10.67	25	48	3.95	9	640	27.83	64	35	.90	2	43.35	43.39
SEPT 22 1983	208	10.37	24	48	3.95	9	640	27.83	65	35	.90	2	43.05	38.41*
OCT 17 1983	33	1.65	46	7	.59	16	28	1.22	34	6	.15	4	3.61	3.46
OCT 18 1983	38	1.90	43	13	1.07	24	28	1.22	28	8	.21	5	4.39	3.77*
FEB 17 1984	22	1.18	34	5	.38	12	39	1.70	52	3	.09	3	3.26	3.05
FEB 18 1984	35	1.75	39	11	.91	20	37	1.61	36	10	.25	5	4.52	3.36*
SEPT 30 1984	51	2.55	35	13	1.06	15	79	3.43	48	7	.18	2	7.22	7.15
OCT 01 1984	42	2.07	34	14	1.13	18	62	2.69	44	8	.21	3	6.10	7.02*
JULY 02 1985	267	13.32	27	55	4.52	9	712	30.96	62	43	1.10	2	49.90	56.89*
JULY 03 1985	263	13.12	26	57	4.69	9	719	31.26	62	48	1.02	2	50.09	62.48*

	ANIONS												ANION TOTAL	CATION TOTAL
	CL			SO4			HCO3			CO3				
DATE	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	EPM	EPM
MAR 14 1982	26	.73	42	14	.29	17	44	.72	41	<5.00	.00	0	1.74	1.68
AUG 13 1982	1575	44.37	79	450	9.37	17	112	1.84	3	18	.34	1	55.91	54.87
AUG 27 1982	38	1.07	29	61	1.27	35	81	1.32	36	<5.00	.00	0	3.66	3.14*
SEPT 24 1982	165	4.65	48	110	2.29	24	148	2.42	25	8	.26	3	9.62	9.48
SEPT 21 1983	1200	33.80	78	330	6.87	16	148	2.42	6	9	.30	1	43.39	43.35
SEPT 22 1983	1030	29.01	76	320	6.66	17	134	2.20	6	16	.54	1	38.41	43.05*
OCT 17 1983	40	1.13	33	40	.83	24	91	1.50	43	<5.00	.00	0	3.46	3.61
OCT 18 1983	39	1.10	29	41	.85	23	111	1.82	48	<5.00	.00	0	3.77	4.39*
FEB 17 1984	65	1.83	60	20	.42	14	49	.80	26	<5.00	.00	0	3.05	3.26
FEB 18 1984	68	1.92	57	20	.41	12	63	1.04	31	<5.00	.00	0	3.36	4.52*
SEPT 30 1984	140	3.94	55	54	1.12	16	127	2.08	29	<5.00	.00	0	7.15	7.22
OCT 01 1984	133	3.75	53	53	1.11	16	132	2.16	31	<5.00	.00	0	7.02	6.10*
JULY 02 1985	1340	37.75	66	788	16.40	29	167	2.74	5	<5.00	.00	0	56.89	49.90*

TABLE VII (cont'd)

JULY 03 1985	1470	41.41	66	880	18.31	29	168	2.76	4	<5.00	.00	0	62.48	50.09*

* INDICATES ANION AND CATION TOTALS DON'T LIE WITHIN 10% OF EACH OTHER.

+ INDICATES A MAJOR PARAMETER IS MISSING.

TABLE VIII

MAJOR ION CHEMISTRY

DOMTARSURF
TYPE - WATER
LOCATION PSB

DOMTAR QUARRY PIPER DIAGRAM

	CATIONS												CATION TOTAL	ANION TOTAL
	CA			MG			NA			K				
DATE	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	EPM	EPM
NOV 30 1981	58	2.89	53	16	1.32	24	26	1.13	21	6	.15	3	5.49	5.04
MAR 24 1982	34	1.70	45	8	.67	18	30	1.30	34	5	.12	3	3.79	3.63
AUG 13 1982	97	4.84	33	22	1.81	13	173	7.52	52	11	.28	2	14.45	14.04
AUG 27 1982	43	2.14	70	9	.72	23	3	.12	4	4	.11	3	3.09	3.60*
SEPT 24 1982	70	3.49	46	18	1.48	20	55	2.39	32	6	.16	2	7.52	10.48*
SEPT 21 1983	220	10.97	27	51	4.28	10	570	24.78	61	29	.74	2	40.69	40.42
SEPT 22 1983	223	11.12	27	52	4.28	10	570	24.78	61	29	.74	2	40.93	38.87
OCT 17 1983	30	1.50	44	7	.55	16	27	1.17	35	6	.15	4	3.37	3.24
OCT 18 1983	38	1.90	43	13	1.07	24	28	1.22	28	8	.20	5	4.38	3.58*
FEB 17 1984	23	1.13	34	5	.38	11	40	1.74	52	4	.09	3	3.33	3.03
FEB 18 1984	41	2.04	41	13	1.07	21	38	1.65	33	9	.22	4	4.99	3.38*
SEPT 30 1984	64	3.17	37	16	1.30	15	87	3.80	45	9	.24	3	8.50	8.30
OCT 01 1984	67	3.32	38	17	1.37	16	87	3.77	43	10	.26	3	8.72	8.37
JULY 02 1985	239	11.92	28	51	4.19	10	685	26.30	61	34	.87	2	43.29	45.81
JULY 03 1985	236	11.77	27	52	4.30	10	615	26.74	61	32	.81	2	43.63	46.30

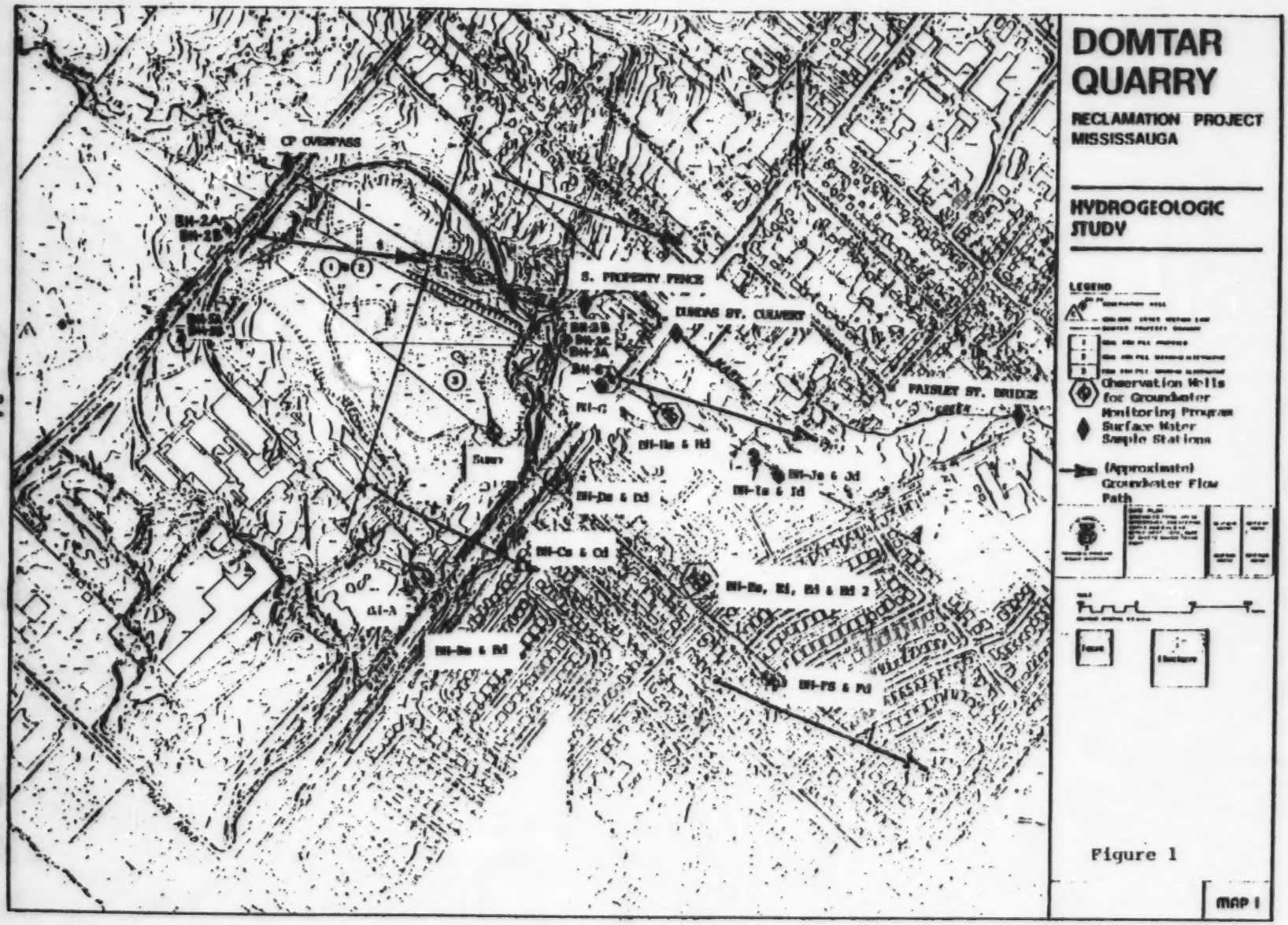
	ANIONS												ANION TOTAL	CATION TOTAL
	CL			SO4			HCO3			CO3				
DATE	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	MG/L	EPM	%EPM	EPM	EPM
NOV 30 1981	46	1.30	26	74	1.54	31	134	2.20	44	0	.00	0	5.04	5.49
MAR 24 1982	50	1.41	39	24	.50	14	185	1.72	47	<5.00	.00	0	3.63	3.79
AUG 13 1982	242	6.82	49	175	3.64	26	195	3.20	23	11	.38	3	14.04	14.45
AUG 27 1982	38	1.07	30	59	1.23	34	79	1.30	36	<5.00	.00	0	3.60	3.09*
SEPT 24 1982	165	4.65	45	140	2.91	28	162	2.66	26	5	.18	2	10.40	7.52*
SEPT 21 1983	1100	30.99	77	310	6.45	16	155	2.54	6	13	.44	1	40.42	40.69
SEPT 22 1983	1060	29.86	77	290	6.04	16	149	2.44	6	16	.54	1	38.87	40.93
OCT 17 1983	36	1.01	31	38	.79	24	88	1.44	44	<5.00	.00	0	3.24	3.37
OCT 18 1983	35	.99	28	37	.77	22	106	1.74	50	<5.00	.00	0	3.50	4.38*
FEB 17 1984	65	1.84	61	19	.39	13	49	.80	26	<5.00	.00	0	3.03	3.33
FEB 18 1984	67	1.88	56	20	.41	12	67	1.10	32	<5.00	.00	0	3.38	4.99*
SEPT 30 1984	140	3.94	47	74	1.54	19	157	2.58	31	7	.24	3	8.30	8.50

TABLE VIII (cont'd)

OCT 01 1984	138	3.89	46	81	1.69	28	171	2.88	33	<5.00	.00	0	8.37	8.72
JULY 02 1985	1070	30.14	66	599	12.47	27	195	3.20	7	<5.00	.00	0	45.81	43.29
JULY 03 1985	1080	30.42	66	608	12.65	27	196	3.22	7	<5.00	.00	0	46.30	43.63

* INDICATES ANION AND CATION TOTALS DON'T LIE WITHIN 10% OF EACH OTHER.

+ INDICATES A MAJOR PARAMETER IS MISSING.


CP OVERPASS
BH-2A
BH-2B
S. PROPERTY FENCE
DIXIE ST. CULVERT
BH-3B
BH-3C
BH-3A
BH-G
PAISLEY ST. BRIDGE
BH-G
BH-1a & 1d
BH-1e & 1d
BH-1e & 3d
BH-2a & 2d
BH-Ca & Cd
BH-Ba, B1, B1 & B1 2
BH-Aa & Ad
BH-FS & Pd
DOMTAR QUARRY
RECLAMATION PROJECT
MISSISSAUGA
HYDROGEOLOGIC STUDY
LEGEND
Observation Wells for Groundwater Monitoring Program
Surface Water Sample Stations
(Approximate) Groundwater Flow Path
Figure 1
MAP 1

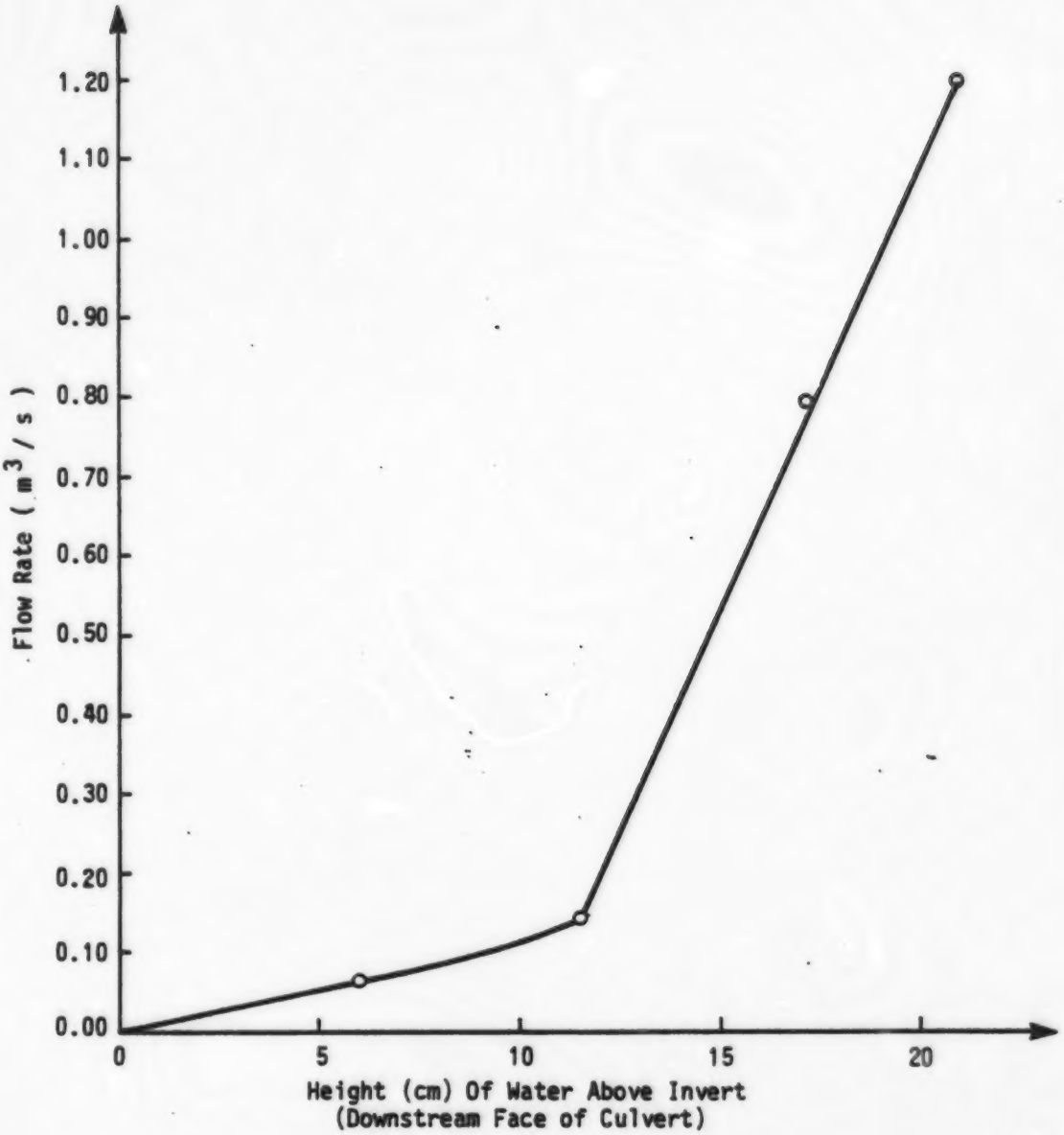


FIGURE 2

CALIBRATION CURVE OF MARY FIX CREEK DISCHARGE AT CP RAILWAY OVERPASS

FIGURE 3

MAJOR ION CHEMISTRY
DOMTARSURF
TYPE - WATER
LOCATION CPO
DOMTAR QUARRY PIPER DIAGRAM

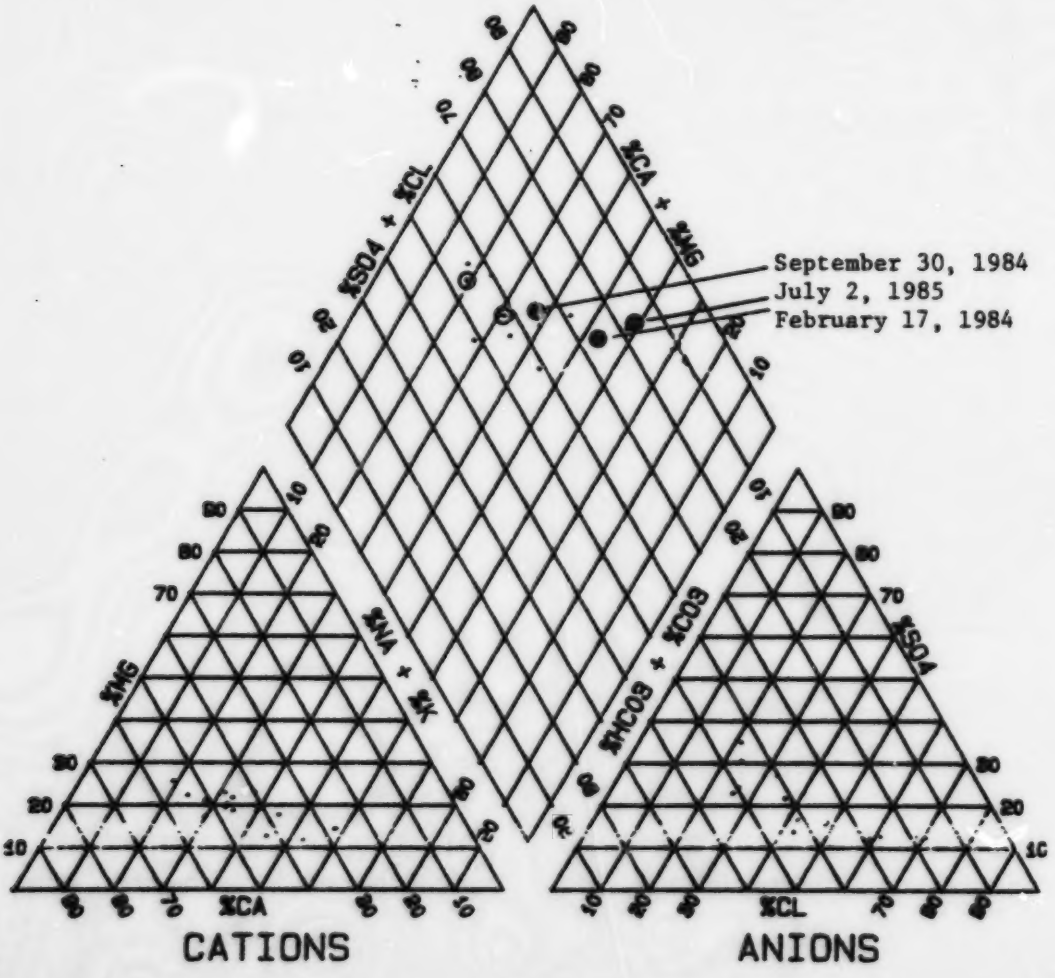


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FIGURE 4

MAJOR ION CHEMISTRY
DOMTARSURF
TYPE - WATER
LOCATION SPF
DOMTAR QUARRY PIPER DIAGRAM

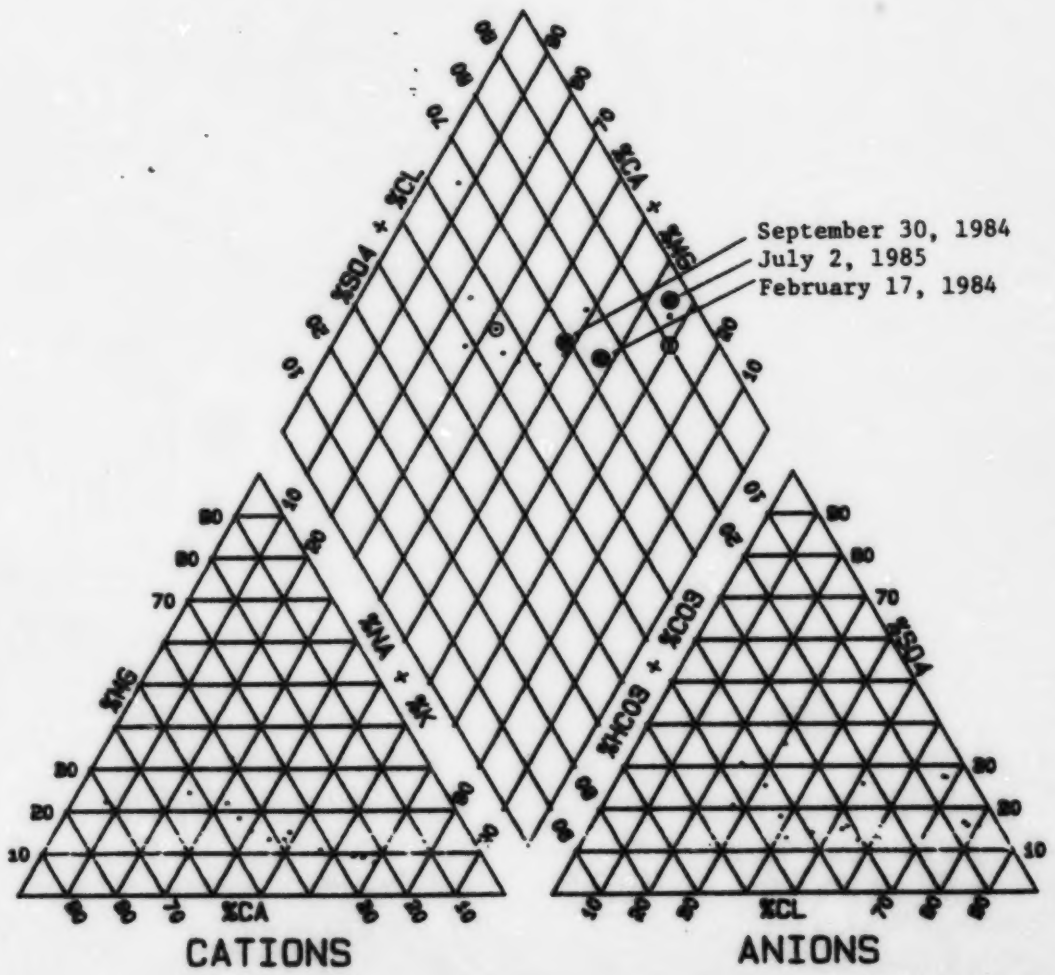

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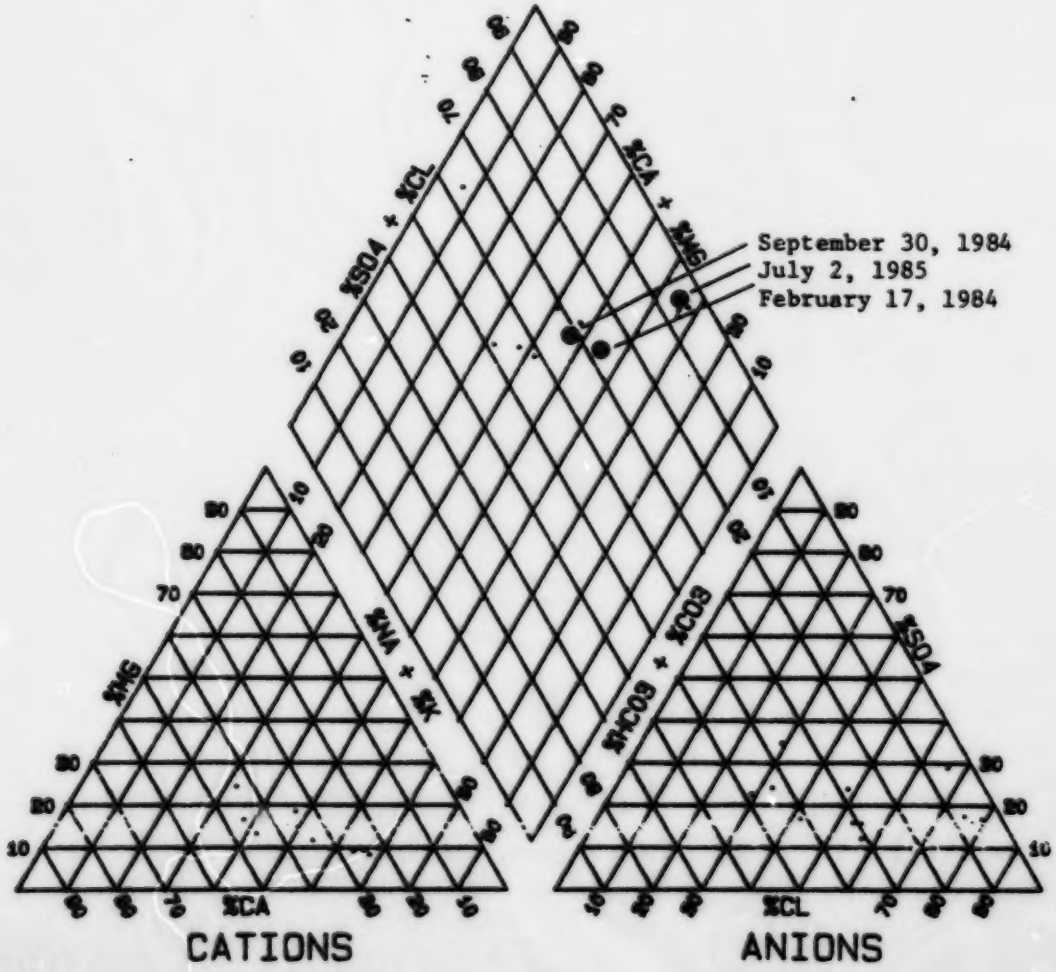
FIGURE 5

MAJOR ION CHEMISTRY
DOMTARSURF
TYPE - WATER
LOCATION DSC
DOMTAR QUARRY PIPER DIAGRAM



85-326

FIGURE 6

MAJOR ION CHEMISTRY
DOMTARSURF
TYPE - WATER
LOCATION PSB
DOMTAR QUARRY PIPER DIAGRAM